



ACC.14

TCT@ACC-12 | innovation in intervention

A566

JACC April 1, 2014

Volume 63, Issue 12



## Congenital Heart Disease

### REDUCED HEPATIC VENOUS FLOW IS A MARKER OF ADVERSE OUTCOMES IN PATIENTS WITH FONTAN CIRCULATION

Poster Contributions

Hall C

Sunday, March 30, 2014, 9:45 a.m.-10:30 a.m.

Session Title: The Failing Heart in Congenital Heart Disease

Abstract Category: 9. Congenital Heart Disease: Adult

Presentation Number: 1191-266

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**Background:** Liver injury and portal hypertension are significant complications of the Fontan circulation and are thought to result from chronic venous hypertension. The flow characteristics of the involved veins, specifically the hepatic vein (HV), are unknown in this population, and their association with clinical outcomes has not been studied. We hypothesize that decreased HV flow is associated with adverse clinical outcomes.

**Methods:** A retrospective review of 58 adult post-Fontan patients referred for an echocardiographic evaluation from 2001 to 2013 was performed. The Doppler echocardiographic data was used to estimate the HV flow. The relationship between HV flow per cardiac cycle (HV cross-sectional area multiplied by the average velocity time integral per cardiac cycle) and outcome measures, which were features of portal hypertension (VAS score  $\geq 2$ , 1 point each for Varices, Ascites, or Splenomegaly) or a major adverse event (death or heart transplant) were examined using multivariable logistic regression.

**Results:** 58 post-Fontan patients (79.3% systemic left ventricle, mean age  $29.3 \pm 8.2$  years, mean interval from Fontan  $22.4 \pm 4.8$  years) were included in analysis. The mean hepatic venous flow per cardiac cycle was  $12.1 \pm 10.9$  ml, mean HV diameter was  $1.2 \pm 0.4$  cm, and the mean anterograde-retrograde HV flow ratio was  $2.9 \pm 2.3$ . Features of portal hypertension (VAS score  $\geq 2$ ) were present in 14 (24.1%), and there were 16 (27.6%) major adverse events: death ( $n = 11$ ) and transplant ( $n = 8$ ). After adjusting for time since Fontan operation and age, a significant relationship was found between HV flow per cardiac cycle and both major adverse events and features of portal hypertension: the estimated odds ratio for VAS score  $\geq 2$  comparing 25th percentile to 50th percentile of HV flow was 2.29 [95% CI 1.06-4.93,  $p=0.034$ ], and that for death and need for transplant was 2.16 [95% CI 1.00-4.64,  $p=0.049$ ].

**Conclusions:** Hepatic venous flow is a novel echocardiographic marker associated with major clinical adverse outcomes in Fontan patients. Future prospective studies are needed to establish the reproducibility and predictability of this novel marker.